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(54) A PROCESS AND A PLANT FOR PRODUCTION OF MULTILAYER TRIM ELEMENTS FOR VEHICLES

VERFAHREN UND ANLAGE ZUM HERSTELLEN VON MEHRSCHICHTIGEN VERKLEIDUNGSTEILEN FÜR KRAFTFAHRZEUGE

PROCESSUS ET INSTALLATION POUR PRODUIRE DES ELEMENTS DE GARNITURE POUR VEHICULES

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a method, to a plant for the production of multi-layer autovehicles trim panels in thermoplastic material, to a multi-layer element and to the use of the multi-layer element. More particularly, the present invention relates to a method for the production of vehicle interior elements such as, for instance, panels, hatboxes, dashboards, consoles and the like, by thermoforming multi-layer sheets.

BACKGROUND OF THE INVENTION

[0002] Thermoformed autovehicles interiors are generally obtained from sheets comprising a support material and an external covering layer for aesthetic purposes. According to a widely known and used technique, the external covering (known as "imitation leather") is produced separately and thereafter joined to the support previously heated in a press. The press also provides for the shaping of the panel into the required form.

[0003] The support material is generally a polyolefin resin with a vegetable filler comprising for the most part wood powder. The imitation leather is generally in PVC and comprises a layer of cotton fabric or other textile material which acts as a mechanical bonding means for the polyolefin support.

[0004] This technique has several of drawbacks. In the first place, the cost and weight of the traditional imitation leather in PVC are both quite high. A second problem arises from the costs of the process, which requires many steps - some of which are particularly long - such as the cutting of the imitation leather and its positioning on the support plate. Further problems derive from the anisotropy of the panel as produced, from the fact that to recycle the waste or the panel at the end of its life it is necessary to remove the imitation leather (PVC) from the support layer (PP), and problems arise from the mechanical and hand (touch) characteristics of the product

[0005] It has been proposed to produce the panels and the vehicle interior elements by co-injecting the support material and the external imitation leather material. This solution resolves many of the preceding problems but is suited to some types of panel only.

[0006] The European Patent Application no. 0668142 discloses a method according to which sheets formed from a support layer and two external covering layers are co-extruded; these sheets are then thermoformed to give trim panels for cars, packing containers and the like. The support comprises polyolefin and an organic filler, particularly cellulose fibers, and the covering layers comprise polyolefin and inorganic fillers such as talc and carbonate. Panels of this type apparently present acceptable mechanical characteristics, but aesthetic and hand characteristics are completely insufficient.

[0007] WO 98 05489 describes a thermoformable panel of the imitation leather type, or similar, which is manufactured by means of lamination of an extruded covering layer (made of PP-EPR mixed with 10 % of homopolymeric PP) on at least one side of an extruded supporting layer made of thermoformable plastic filled with inert organic material. The lamination is carried out on exit from the extruder. The embossing of the coating layer is carried out in a subsequent panel shaping phase. It is a document published prior to the international filing date but later than the priority date claimed of the present application. It is the closest prior art.

[0008] GB-A-2067135 relates to a composite structure comprising a rigid polyolefinic plate bonded directly on one or both faces with one or more polyolefin-based flexible layers. The flexible layer of polyolefin may be films based on isotactic polypropylene, polyethylene, thermoplastic propylene-ethylene copolymers and mixtures thereof.

[0009] According to EP-A-0747213 a composite panel of plastic material is manufactured which comprises at least one layer of thermoplastic material (polypropylene) filled with sawdust and/or wood flour and/or wood shavings (Woodstock layer), and of an additional layer applied to one face of said Woodstock layer. This additional layer consists of fibrous thermoplastic material. The two layers (Woodstock layer and fibrous thermoplastic layer) are superimposed and compressed under their simultaneous heating, thereby they become bound mechanically.

[0010] DE-4214389 describes a multi-layer element (automobile trim panel) and a process for its manufacture. The panel is composed of three layers bonded together mechanically thank to the choice of compatible thermoforming materials.

[0011] The three layers are: supporting layer (thermoplastics reinforced with glass-fibres or wood flour), intermediate soft layer (consisting of fibres and textiles) and covering decorative layer. The thermoplastic materials used in the layers for the preparation of automobile trim panel are: polyolefins (polyethylene, polypropylene), polyamide, polyesters.

[0012] DE-4423883 relates to a composite product having two layers. The covering layer comprises polyolefin (see pag. 8, line1) while the supporting layer has a composition which depends qualitatively and quantitatively on the composition of the covering layer (see page 9, line 8). Furthermore, this composite (laminated) product may contain also a further protective layer on the superior surface.

DISCLOSURE OF THE INVENTION

[0013] An object of the present invention is to solve the above cited problems by means of a method for producing autovehicles trim panels by thermoforming that is simple, inexpensive and reliable, and that give panels with good mechanical properties and excellent aesthetic

and hand properties and to obtain thermoformable multi-layer sheets and finished elements having the above characteristics.

[0014] This object is achieved according to the invention by the method as defined in claim 1, by the plant as defined in claim 8, by the multi-layer element as defined in claim 10 and by the use as defined in claim 14.

[0015] Particular embodiments of the invention are the subject of the respective dependent claims.

[0016] According to a preferred embodiment of the invention, support and covering layers are co-extruded.

[0017] According to another aspect of the invention the support layer is obtained by impregnation of two long-fiber needle-punched layers (natural and/or non-woven fabric) with an extruded polyolefin layer; preferably the covering layer is co-laminated on this support.

[0018] The invention also relates to a plant to carry out the method, the plant being characterized according to Claim 8.

[0019] The method according to the invention presents several advantages compared to known methods in the art. The number of steps and the working time are greatly reduced, as it is no longer necessary to produce the imitation leather layer and the support sheets separately and then to join them in a press by thermoforming. Materials with identical or similar bases can be used, for instance PP or polyolefin in general, for both the imitation leather and the support; in this way it is possible to recycle offcuts and production waste. It is no longer necessary to cut the imitation leather and line it up above the support sheet . The embossing of the imitation leather can take place directly in the thermoforming mould, which eliminates the problems of loss of embossing during the thermoforming step and of producing different embossings in different parts of the panel. Besides, the cost of the material is lower; the cost of a imitation leather in PVC is more than double that of an imitation leather produced according to the invention.

[0020] Finally, the resulting panel is more isotropic.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The invention will now be disclosed in greater detail with reference to the enclosed non-limiting drawings, in which:

- fig. 1 is a schematic sectional view of a thermoformable sheet obtained according to the invention;
- fig. 2 is a plant layout for co-extrusion of the sheets according to the invention; and
- fig. 3 is a plant layout for the co-lamination of a sheet according to the invention.

MODES OF CARRYING OUT THE INVENTION

[0022] As mentioned above, the method according to the invention provides for the preparation of a layer of thermoplastic support material comprising a filler, the preparation of a covering (skin) material comprising an amorphous thermoplastic material, the binding of the said support material with said covering to form a substantially flat multi-layer sheet, and the shaping of said sheet by thermoforming .

[0023] As is well known, an amorphous thermoplastic material is a material that has no, or substantially no, crystalline content. Examples of amorphous materials are PVC, ABS, EVA, TPU and EP(D)M, SBR, SEBS rubbers. Polypropylene (co)polymers can be partially amorphous.

[0024] The quantity of amorphous thermoplastic material is between 30% and 100% by weight of the covering material and preferably is at least 60% (w/w).

[0025] Preferably, the support and covering materials are chemically compatible: for instance, a PP based support material with wood powder filler is used with a polypropylene thermoplastic elastomer imitation leather. As an alternative, a means of chemical or mechanical compatibilization, such as for instance stockingette (cotton fabric), can be used. The chemical compatibilization can be obtained by adding compatibilizing agents such as for instance maleic and fumaric acids, maleic anhydride, metoxysilane, acrylic acids or similar compounds to the support or the covering materials during the extrusion of same. A further way of making incompatible materials compatible is to laminate them with a film of compatible material: an example is a laminate comprising a central layer of expanded polyurethane and two external films of PE, PP or EVA. A layer of this type is unrolled from a spool and placed between the material obtained from the two extrusion heads for the support and the covering to improve the hand of the final product.

[0026] Fig. 1 shows a section of a sheet 1 of the type described above, comprising a covering 2, a support 4 and a central foamed layer 3.

[0027] In an embodiment of the invention the foamed layer is obtained by extruding it and expanding it with a chemical or physical expander.

[0028] Fig. 2 shows a co-extrusion plant layout comprising two flat-head co-extruders 9 and 10, to extrude the covering material 9a and the support material 10a respectively. There is also a third extruder 11 to extrude the central layer 3 - for instance an expanded layer - between the two layers 9 and 10.

[0029] The material for the support is a thermoplastic material containing from 10% to 80% by weight of a filler that is preferably an organic cellulose filler, for instance wood powder. If the filler is wood powder, the material of the support is obtained preferably by reactive extrusion. This reactive extrusion is obtained by treating a polyolefin, the wood powder, maleic anhydride and radical initiators in the extruder and was disclosed e.g. in European Patent Application EP-A-0 822 223 in the name of the applicant. A preferred formulation provides for the use of: homo- and co-polymers of propylene, particularly those with isotactic index higher than 30%; be-

tween 20% and 60% by weight of a fibrous reinforcement filler, preferably vegetable like wood powder; from 0.05% to 0.5% of peroxide radical initiators, for instance: dicumilperoxide, and 0,2-2,0% of compatibilizator agent of the type mentioned above.

[0030] Fig. 3 shows schematically the production of another type of support. In this case the support is obtained by passing a layer of polyolefin (preferably PP) and two layers of long-fiber "mats", through a calender 8. The polyolefin is extruded and, while the extruded sheet is still in a partially molten state, it is immediately calendered with the two mats, so that the polyolefin is impregnated and compacted with the mats. Long-fiber mat is here understood to designate those fibrous supports that are obtained by needle-punching or equivalent method using fibers longer than 3 mm and preferably longer than 1 cm. The fibers could be vegetable (jute, flax) or synthetic, particularly non-woven fabric which in same case is not further needle-punched, for instance when it is hydrobonded.

[0031] Preferred fibrous supports are those with long vegetable or mixed vegetable-synthetic fiber, and with weight within the range of 200 to 500g/m^2.

[0032] The material for the covering is a thermoplastic material containing an amorphous polymer material; the quantity of amorphous material is between 30% and 100% by weight of the covering material. Preferably, the cover layer is a polyolefin thermoplastic elastomer.

[0033] Thermoplastic materials useful for producing the covering are selected from among homo- and co-polymers of alpha olefins such as ethylene, propylene, ethylene-propylene, copolymers of propylene containing one or more alpha olefin with 2-10 atoms of carbon (for instance ethylene, 1-butene, 1-pentene, 4-methyl-1-pentene, 1-hexene, 1-ottene); EPM rubbers (ethylene/ propilene) and EPDM rubbers (ethylene/propylene/diene); natural rubber; EVA (ethylene/vinylacetate); ethylene/1-ottene co-polymer; polyenic homo- and co-polimers like the polybutadiene; styrol/ butadiene rubbers (SBR), hydrogenated styrol/butadiene co-polymers (SEBS); acrilo-nitrile/butadiene/styrene co-polymers, their functionalized polymers and their mixtures.

[0034] The quantity of EP(D)M rubbers, or their analogues, used is generally between 6% and 30% by weight of the total weight of the formulation of covering. The rubbers can also be extended with oils (parafin and naphtene types) to increase the softness to the touch; the quantity of oil added is between 20% and 60% by weight of the rubber.

[0035] The starting thermoplastic material should contain cross-linked and non-cross-linked compounds and is preferably obtained by reactive extrusion, i.e. a heat treatment of mixing in the presence of radical initiators (preferably peroxides) and compatibilizing agents. Further examples of suitable thermoplastic elastomers for the present invention are described in Application PCT/EP96/ 00136 (WO 96/22327) in the name of the applicant. Preferably the covering material will be obtained from a mixture of polypropylene, polyalkenylenes (5-15% in weight), EP(D)M rubbers (8-40% in weight) and vinylpolybutadienes (0,5-4,0% in weight).

[0036] The method for co-extrusion provides (fig. 2) for the extrusion of the support material 10a, the external covering material 9a and any inside material 11a through the corresponding extruders 10, 9 and 11. Other extruders are possible to give further additional layers, or layers of ready material (for instance expanded material) may be unwound from a spool 16. The layers of extruded material in a plastic, i.e. partially molten state, are then fed through calender 12 that binds them together and imparts the final thickness of the flat sheet 13 that is drawn from it.

[0037] If necessary, the sheet 13 is then heated in continuous oven 15 and calibrated in continuous press 17; finally, the sheet is thermoformed in continuous press 14 to give the final product.

[0038] In the case of a co-lamination (fig.3), first the layer of support material 7 is extruded, and bonded to mats 6 and 6', then downstream of first calender 8, a layer 9b of covering material is applied to layer 7 and, where necessary, a third layer or a material from a spool similar to that described above is used. The multi-layer is calendered through second calender 8a and thereafter calibrated and thermoformed in a way similar to that cited above.

[0039] The panels thus obtained present a skin layer (made of the covering material) that covers all the visible surface of oneside of the same, i.e. the surface that will be the external surface of the panel once mounted on a vehicle. In the case of a two-layer panel produced with compatible materials, the imitation leather sticks directly to the support layer, in the absence of any physical means of bonding or mutual fixing, such as, e.g. a cotton fabric.

Claims

1. A method for the production of autovehicle trim panels and similar products shaped by thermoforming, comprising the following steps:

   providing a layer of support material (4,10a) comprising thermoplastic material containing from 10% to 80% by weight of a filler selected from vegetable fibers, wood powder and fiber mats;

   providing a layer of covering material (2, 9a) comprising a thermoplastic material comprising from 30% to 100% by weight of an amorphous thermoplastic material selected from a group consisting of amorphous polypropylene, polyvinyl chloride, acrylonitrile-butadiene-styrene copolymers, ethylene-vinyl acetate copolymers, thermoplastic polyurethanes, styrene-butadiene rubbers, ethylene-propylene mono-

mer rubbers, ethylene-propylene(diene)monomer rubbers, hydrogenated styrene-butadiene co-polymers, mixtures thereof;
bonding said layer of support material (4, 10a) to said covering material (2, 9a) to form a substantially flat multi-layer sheet (1); and
shaping said sheet by thermoforming.

2. A method according to claim 1, wherein said sheet is obtained by co-extrusion of said support material (4,10a) and said covering material (2) in a partially molten state.

3. A method according to claim 1, wherein said covering material (9a) is co-laminated on said layer of support material (10a).

4. A method according to any previous claim, wherein one or more additional layers (3, 11a, 16) are arranged and bonded between said covering and said support materials to provide said multilayer sheet.

5. A method according to claim 1 or 2, **characterized by** co-extruding a polyolefin (10a) support layer comprising a vegetable fiber filler and a covering layer of a polyolefin-based thermoplastic elastomer (9a).

6. A method according to claims 1,3 or 4, wherein said support is produced by impregnating and calendering at least one long-fiber mat (6,6') with an extruded layer of thermoplastic material (7).

7. A method according to any previous claim, wherein said support material and/or said covering material are obtained by reactive extrusion.

8. A plant for the production of autovehicle trim panels through to method according to any previous claim, comprising an extruder (5,10) for said support material (7, 10a), an extruder (9) for said covering material (9a), a spool (16, 6, 6') for unwinding a material for a further additional layer (3), at least one calender (8, 12) for bonding together said materials and a press (14) for themoforming multi-layer sheets obtained from said calender (8, 12).

9. A plant according to claim 8, **characterized in that** it comprises a calender (8) for impregnation of long-fibers mat with a polyolefin.

10. A multi-layer element obtainable by the method according to any of claims 1 to 7 **characterised in that** it comprises a layer of support material (4, 10a) comprising from 10% to 80% by weight of a filler and a layer of covering material (2, 9a) made from a thermoplastic material comprising from 30% to 100% by weight of an amorphous thermoplastic material.

11. A multi-layer element according to claim 10, wherein said amorphous material is selected from amorphous polypropylene; PVC; ABS; EVA; TPU; EP(D)M, SBR, SEBS rubbers, and mixtures thereof.

12. A multilayer element according to claim 10 or 11, wherein the layer of support material (4, 10a) is an extruded thermoplastic material to which at least one long-fiber mat is joined.

13. A multi-layer element according to any claim 10 to 12, wherein said supporting layer and said cover layer are made of chemically identical or similar bases to allow common recycling thereof.

14. Use of the multilayer element prepared according to any of claims 1 to 7 as trim for vehicles.

Patentansprüche

1. Verfahren zur Herstellung von durch Warmverformung geformten Fahrzeugzierverkleidungen und ähnlichen Produkten, umfassend die folgenden Schritte:

   Bereitstellen einer Schicht aus Trägermaterial (4, 10a), bestehend aus thermoplastischem Material, das 10 bis 80 Masse-% eines aus Pflanzenfasern, Holzpulver und Faserflies ausgewählten Füllstoffes enthält;
   Bereitstellen einer Schicht aus Deckschichtmaterial (2, 9a), bestehend aus thermoplastischem Material, das 30 - 100 Masse-% eines amorphen thermoplastischen Materiales enthält, ausgewählt aus einer Gruppe bestehend aus amorphem Polypropylen, Polyvinylchlorid, Acrylnitril-Butadien-Styrol-Copolymeren, Ethylen-Vinylazetat-Copolymeren, thermoplastischen Polyurethanen, Styrol-Butadien-Kautschuken, Ethylen-Propylen-Monomer-Kautschuken, Ethylen-Propylen-(Dien)-Monomer-Kautschuken,hydriertenStyrol-Butadien-Copolymeren, Mischungen daraus;
   Verbinden der Schicht aus Trägermaterial (4, 10a) mit dem Deckschichtmaterial (2, 9a) zum Ausbilden einer im wesentlichen flachen, mehrschichtigen Platte (1); und Formgeben der Platte durch Warmverformung.

2. Verfahren gemäß Anspruch 1, bei dem die Platte durch Koextrusion des Trägermateriales (4, 10a) und des Deckschichtmateriales (2) in einem teilweise schmelzflüssigen Zustand erhalten wird.

3. Verfahren gemäß Anspruch 1, bei dem das Deck-

schichtmaterial (9a) auf der Schicht aus Trägermaterial (10a) auflaminiert ist.

4. Verfahren gemäß einem der vorhergehenden Ansprüche, bei dem eine oder mehrere zusätzliche Schichten (3, 11a, 16) zwischen den Deckschicht- und Trägermaterialien angeordnet und verbunden sind, um die Mehrschichtplatte zu bilden.

5. Verfahren gemäß Anspruch 1 oder 2, **gekennzeichnet durch** Koextrusion einer Polyolefin -Trägerschicht (10a), bestehend aus einem Pflanzenfaserfüllstoff, und einer Deckschicht aus einem thermoplastischen Elastomer (9a) auf Polyolefinbasis.

6. Verfahren gemäß Anspruch 1, 3 oder 4, bei dem der Träger durch Imprägnieren und Kalandern mindestens einer langfaserigen Matte (6, 6') mit einer extrudierten Schicht aus thermoplastischem Material (7) hergestellt wird.

7. Verfahren gemäß einem der vorhergehenden Ansprüche, bei dem das Trägermaterial und/oder das Deckschichtmaterial durch reaktive Extrusion erhalten werden.

8. Anlage zur Herstellung von Fahrzeugzierverkleidungen mit dem Verfahren gemäß einem der vorhergehenden Ansprüche, umfassend einen Extruder (5, 10) für das Trägermaterial (7,10a), einen Extruder (9) für das Deckschichtmaterial (9a), eine Spule (16, 6, 6') zum Abwickeln eines Materiales für eine weitere zusätzliche Schicht (3), mindestens einen Kalander (8, 12) zum Miteinanderverbinden der Materialien und eine Presse (14) zum Warmformen der vom Kalander (8, 12) erhaltenen Mehrschichtplatten.

9. Anlage gemäß Anspruch 8, **gekennzeichnet dadurch, dass** sie einen Kalander (8) zum Imprägnieren von langfaserigen Matten mit einem Polyolefin umfasst.

10. Mehrschichtelement, das durch das Verfahren gemäß einem der Ansprüche 1 bis 7 erhalten wird, **gekennzeichnet dadurch, dass** es aus einer Schicht aus Trägermaterial (4, 10a), das 10 - 80 Masse-% eines Füllstoffes enthält, und einer Schicht aus Deckschichtmaterial (2, 9a) besteht, das aus einem thermoplastischen Material hergestellt ist, das 30 - 100 Masse-% eines amorphen thermoplastischen Materiales enthält.

11. Mehrschichtelement gemäß Anspruch 10, bei dem das amorphe Material ausgewählt wird aus amorphem Polypropylen; PVC; ABS; EVA; TPU; EP(D)M, SBR, SEBS-Kautschuken, und Mischungen daraus.

12. Mehrschichtelement gemäß Anspruch 10 oder 11, bei dem die Schicht aus Trägermaterial (4, 10a) ein extrudiertes thermoplastisches Material ist, mit dem mindestens eine langfaserige Matte verbunden ist.

13. Mehrschichtelement gemäß einem der Ansprüche 10 bis 12, bei dem die Trägerschicht und die Deckschicht aus chemisch identischen oder ähnlichen Grundstoffen hergestellt ist, um ihr gemeinsames Recycling zu erlauben.

14. Anwendung des gemäß einem der Ansprüche 1 bis 7 hergestellten Mehrschichtelementes als Zierverkleidung für Kraftfahrzeuge.

Revendications

1. Méthode de fabrication de panneaux de garnissage pour véhicule automobile et produits similaires obtenus par thermoformage, comprenant les stades suivants :

   - fabrication d'une couche de matière support (4.10a) composée d'une matière thermoplastique comprenant de 10% à 80% en poids d'un remplissage sélectionné parmi des fibres végétales, de la poudre de bois et des mats de fibres ; fabrication d'une couche de matière de revêtement (2, 9a) composée d'une matière thermoplastique comprenant de 30% à 100% en poids, d'une matière thermosplastique amorphe, choisie dans un groupe comprenant : polypropylène amorphe, chlorure de polyvinyle, co-polymères d'acrylnitrile-butadiène-styrène, copolymères d'acétate d'éthylène-vinyle, polyuréthanes thermoplastiques, caoutchouc styrène-butadiène, caoutchoucs monomères éthylène-propylène(diène), co-polymères hydrogénés styrène-butadiène, ainsi que des mélanges d'entre eux.
   - liaison des dites couches de matière support (4, 10a) avec ladite matière de garnissage (2, 9a) pour former une feuille multicouches pratiquement plane (1) ; et mise en forme de ladite feuille par thermoformage.

2. Méthode suivant la revendication 1, dans laquelle ladite feuille est obtenue par co-extrusion à l'état de fusion partielle de ladite matière support (4, 10a) et de ladite matière du garnissage (2).

3. Méthode suivant la revendication 1, dans laquelle ladite matière du garnissage (9a) est co-laminée sur ladite couche de la matière du support (10a).

4. Méthode suivant l'une des revendications précédentes , dans laquelle on dispose une ou plu-

sieurs couches additionnelles (3, 11a, 16) et on les applique entre lesdites matières de garnissage et de support pour réaliser ladite feuille multicouche.

5. Méthode suivant la revendication 1 ou 2, **caractérisée par** la co-extrusion d'une couche support en polyoléfine (10a) comprenant un remplissage de fibre végétale et une couche de remplissage en élastomère thermoplastique à base de polyoléfines (9a).

6. Méthode suivant les revendications 1, 3 ou 4, dans laquelle ledit support est fabriqué par imprégnation et calandrage d'un mat à fibres longues (6, 6') avec une couche extrudée de matière thermoplastique (7).

7. Méthode suivant la revendication 1, dans laquelle ladite matière du support et/ou la matière du dit garnissage est obtenue par extrusion réactive.

8. Installation pour la fabrication de panneaux de garnissage de véhicule selon une méthode conforme à une ou plusieurs des revendications, comprenant une extrudeuse (5, 10) pour ladite matière du support (7, 10a), et une extrudeuse pour la dite matière de garnissage (9a), une bobine (16, 6, 6') pour dérouler la matière d'une couche additionnelle (3), et au moins une calandreuse (8, 12) pour relier ensemble lesdites matières et une presse (14) pour thermoformer les feuilles multicouches sortant de la dite calandreuse (8, 12).

9. Installation suivant la revendication 8, **caractérisée en ce qu'**elle comprend une calandreuse (8) pour l'imprégnation d'un mat à fibres longues par une polyoléfine.

10. Un élément multicouches pouvant être obtenu par la méthode selon l'une des revendications 1 à 7, **caractérisée en ce qu'**elle comprend une couche de matière de support (4, 10) avec de 10% à 90% en poids, de remplissage, et une couche de matière de remplissage (2, 9A) composée d'une matière thermoplastique comprenant 30% à 100% en poids de matière thermoplastique amorphe.

11. Un élément multicouches selon la revendication 10, dans laquelle la dite matière amorphe est choisie à partir de polypropylène amorphe ; PVC ; ABS ; EVA ; TPU ; EP(D)M ; SBR ; caoutchoucs SEBS et un mélange de ces matières.

12. Un élément multicouches selon la revendication 10 ou 11, dans laquelle ladite couche de matière de support est une matière thermoplastique extrudée sur laquelle est appliqué au moins un mat à fibres longues.

13. Un élément multicouches selon l'une des revendications 10 à 12, dans laquelle ladite couche support et ladite couche de garnissage sont réalisées sur des bases chimiques identiques ou similaires afin de pouvoir les recycler ensemble.

14. Utilisation de l'élément multicouche élaboré selon l'une des revendications 1 à 7 en tant que garnissage de véhicules.

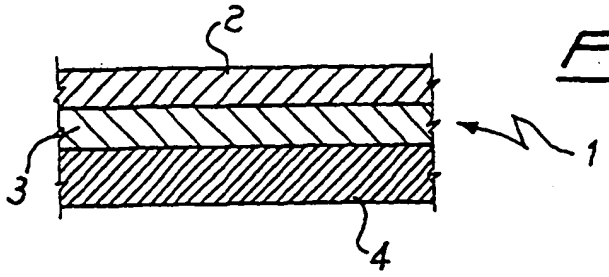

Fig.1

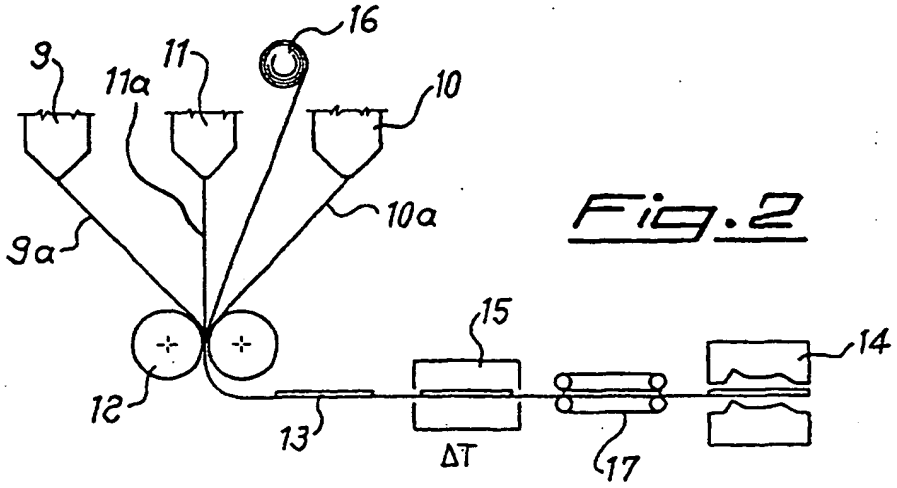

Fig.2

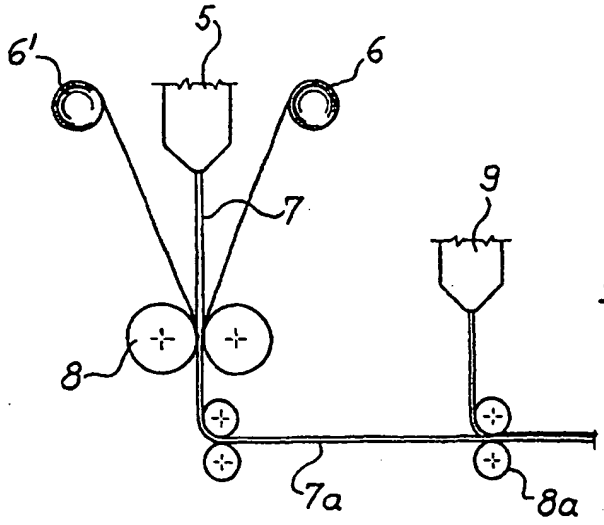

Fig.3